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EXAMINER

CARROLL, J

B5M1/0726

ART UNIT

PAPER NUMBER

2508

DATE MAILED:

07/26/95

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This is a communication from the examiner in charge of your application.  
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☒ Responsive to communication filed on 30 May 95 ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), 2 days from the date of this letter.  
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- ☐ Notice of References Cited by Examiner, PTO-892.
- ☐ Notice of Draftsman's Patent Drawing Review, PTO-948.
- ☐ Notice of Art Cited by Applicant, PTO-1449.
- ☐ Notice of Informal Patent Application, PTO-152.
- ☐ Information on How to Effect Drawing Changes, PTO-1474.
- ☐

Part II SUMMARY OF ACTION

1. ☒ Claims 17 to 53 are pending in the application.

Of the above, claims \_\_\_\_\_ are withdrawn from consideration.

2. ☒ Claims 1 to 16 have been cancelled.

3. ☐ Claims \_\_\_\_\_ are allowed.

4. ☒ Claims 17 to 53 are rejected.

5. ☐ Claims \_\_\_\_\_ are objected to.

6. ☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8. ☐ Formal drawings are required in response to this Office action.

9. ☐ The corrected or substitute drawings have been received on \_\_\_\_\_. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).

10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on \_\_\_\_\_, has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).

11. ☐ The proposed drawing correction, filed \_\_\_\_\_, has been ☐ approved; ☐ disapproved (see explanation).

12. ☐ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. \_\_\_\_\_; filed on \_\_\_\_\_.

13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14. ☐ Other

EXAMINER'S ACTION

PTOL 326 (Rev. 2/93)  
R27/15-27.85

We have entered as Paper No. 13 the PRELIMINARY AMENDMENT under 37 C.F.R. 1.62 filed 30 May 1995. The amendment, however, does not include necessary updated continuing data that should appear prior to the first line of the Specification. We thus request an appropriate amendment in response.

In consideration of the REMARKS on amendment pages 7 to 11 we express the following observations and opinions.

In the main, the Applicants fill amendment pages 7, 8 and 9 with excerpts from previous communications to erroneously conclude again on amendment page 10 that Claims 17 to 29 are unobvious from Tonnel essentially because the substrate slot accommodating Tonnel's insulated gate electrode is V-shaped whereas the Applicants disclose a U-shaped slot instead. In fact, Tonnel characterizes his V-slotted MOSFET as a V-MOS and his obvious U-slotted MOSFET as a U-MOS. Yet the Applicants continue to maintain their contention that their U-MOS is different in kind and accordingly characterize theirs as a trench DMOS instead.

What is it that we are missing here when we suppose that a U-MOS, a V-MOS and a trench DMOS cell require trenching the semiconductor substrate? We maintain that we rightly are obliged to interpret the claimed trench DMOS terminology as broadly as the trench gate MOSFET art can reasonably support. We have concluded with certainty in Paper No. 12 that Blanchard of Blanchard '535 would have agreed with our position. Certainly the Applicants lamely but gamely dropped the ball by not responding to the fact that Blanchard looks upon his U-slotted MOSFET as a vertical DMOS transistor.

The Applicants acknowledge on amendment page 11 that discrepancies exist between the structure shown with Figure 3 by Tonnel and the structures shown in remaining Figures 4 to 19. We resolved the discrepancies in favor of the preponderance of evidence exhibited with Figures 4 to 19, especially in view of the fact that cross-sectional views more clearly and more readily show positional relationships among the elements displayed than does the single perspective of Figure 3 that emphasizes the V-shaped slot in the foreground and deemphasizes the deep P-type regions (22) in the mid and backgrounds. The record clearly shows that the Applicants prefer to disregard the preponderance of evidence embodied with Figures 4 to 19 because it renders their Invention unpatentable within the ambit of 35 U.S.C. 103.

Not discerning a reasonable basis to disregard the preponderance of evidence provided by Tonnel, we maintain the following Claim rejections.

Claims 17 to 29 are rejected under 35 U.S.C. 103, excerpted on pages 4 and 5 of Paper No. 4 and incorporated herein by reference thereto, as being unpatentable over Tonnel, as amply discussed supra and in the record.

Observing that the Applicants did not effectively respond to the double patenting rejections, we maintain the double patenting as expressed on pages 3 and 4 of Paper No. 8, incorporated herein by reference thereto.

We extend onto new grounds the following Claim rejections.

Newly presented Claim 36<sup>1</sup> is rejected under 35 U.S.C. 112, fourth paragraph, as being of improper dependent form for failing to further limit the subject matter of a previous Claim. Claim 36 does not limit a Claim previously set forth because it depends upon itself, instead.

Newly presented Claims 31, 41, 42, 43, 52 and 53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the Invention. Claim 31 is vague and indefinite because there are no antecedent bases for "said trench", "said bottom surfaces", "said side surfaces", "said top surface" and "said third covering layer", notwithstanding the fact that no bottom surface of any trench disclosed is shown as meeting a top surface. Claim 41 is vague and indefinite with respect to "the oxide layer" because one must speculatively determine whether "the oxide layer" refers to "a gate oxide layer" of Claim 40, and/or to "an oxide layer" of Claim 39 that "is etched". Similar considerations apply to Claim 42 with respect to its recitation of "said oxide layer" on Claim lines 3-4. Claim 43 is vague and indefinite because there are no antecedent bases for "the gate region", "the drain region" and "the source region". Claim 52 is vague and indefinite because there are no antecedent basis for "said first region", first recited on Claim line 4. Claim 53 is vague and indefinite because there are no antecedent bases for "said deepest part", "said third region", and "said deepest part of said third region".

Newly presented Claims 32, 33, 34, 35, 36, 43, 44, 46, 47, 48, 49, 51, 52 and 53, insofar as in compliance with 35 U.S.C.

112, are rejected under 35 U.S.C. 103 as being unpatentable over considerations of Tonnel.

In re Claim 32, breakdown would have inherently occurred away from either the V-shaped or U-shaped trenches envisaged by Tonnel due to the presence of deepest P-type region (22) as is clearly evident from Figure 16, for example.

In re Claim 33, Tonnel expected to form a substrate and epitaxial layer with one conductivity type and a body region with another conductivity type.

In re Claim 34, Tonnel expected to form a body region to extend froma top surface.

In re Claim 35, Tonnel expected to form a source region in an epitaxial layer.

In re Claim 36, Tonnel expected to form a more heavily doped P-type region evidently from the further P-type doping step shown in Figure 9 that successfully further dopes deepest P-type region (92) initially formed in the step shown with Figure 4.

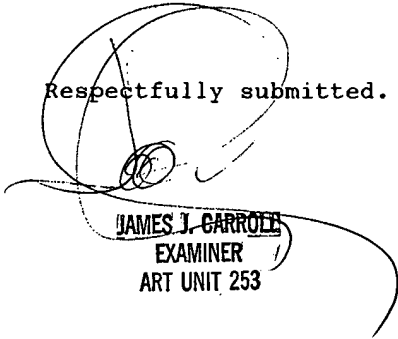
Newly presented Claims 30 to 53 are rejected under the judicially established doctrine of obviosity-type double patenting as being unpatentable over Patent Claim 2 and its dependent Claims in US 5,072,266, but further considered with Tonnel teaching that differences between the claimed subject matters would have been obvious, notwithstanding the fact that In re Schneller, 158 USPQ 210 (CCPA 1968) makes no demands upon us to analyze differences because only a single embodiment is involved.

We reject all Claims.

We set a period for response of three months from the date of this USPTO action.

An inquiry concerning this communication may be directed to Examiner J. Carroll at telephone number 703-308-4926 or, to the Group 2500 Reception Person at telephone number 703-308-0956. Written communications may be accepted in Art Unit 2508 at FAX number 703-308-7723.

Respectfully submitted.



JAMES J. CARROLL  
EXAMINER  
ART UNIT 253